

Remarks

Claim Rejections Under 35 USC 103(a)

Claims 34-35, 39-41, 43, 49 and 51 have been rejected under 35 USC 103(a) as being unpatentable over Fjelstad et al. (US Patent No. 5,615,824) in view of Maruyama et al. (US Patent No. 6,661,247).

Claim 38 has been rejected under 35 USC 103(a) as being unpatentable over Fjelstad et al. (US Patent No. 5,632,631) and Maruyama et al. (US Patent No. 6,661,247) in view of Sugiyama et al. (US Patent No. 4,766,666).

Claims 40-41 and 50 have been rejected under 35 USC 103(a) as being unpatentable over Fjelstad et al. (US Patent No. 5,632,631) and Maruyama et al. (US Patent No. 6,661,247) in view of Kazle (US Patent No. 5,936,847).

The rejections under 35 USC §103 are traversed for reasons to follow.

Reading of Claims

Following is a claim chart reading the amended claims on the drawings and specification.

<p>34. A method for fabricating an interconnect 10 for electrically engaging a semiconductor component with a least one bumped contact comprising:</p>	<p>interconnect 10, pg. 9, lines 6-30 semiconductor component 18 bumped contact 14B</p>	<p>Fig. 1 Fig. 3B Fig 7G</p>
<p>providing a substrate having a</p>	<p>substrate 14B, pg. 18, line 33 - pg. 19, line 3</p>	<p>Fig. 7A</p>
<p>first surface and a second surface;</p>	<p>first surface 26B</p>	<p>Fig. 3C</p>
<p>forming a plurality of leads on the first surface</p>	<p>second surface 44B</p>	<p>Fig. 3C</p>
<p>configured to electrically engage and support the bumped contact, the leads having terminal portions and support portions connected by a connecting segment;</p>	<p>leads 22B, pg. 19, lines 10-14 surface 26B</p>	<p>Fig. 7C Fig. 3C</p>
<p>forming a recess in the first surface at least partially encircled by the connecting segment configured to support and cantilever the terminal portions over the recess for movement within the recess during electrical engagement of the bumped contact; and</p>	<p>14B, pg. 4, lines 18-21</p>	<p>Fig. 3B Fig. 7G Fig. 7G</p>
<p>forming an opening through the connecting segment and the substrate to the second surface; depositing a conductive material in the opening; and forming a contact on the second surface in electrical communication with the conductive material.</p>	<p>connecting segment 40B, pg. 19, lines 11-14</p>	<p>Figure 7I</p>
	<p>recess 20B, pg. 21, lines 10-14</p>	<p>Figure 7F</p>
	<p>pg. 21, lines 12-14</p>	
	<p>pg. 13, lines 5-8</p>	
	<p>opening 60D, pg. 19, lines 15-17</p>	<p>Fig. 7D</p>
	<p>conductive material 66B, pg 20, lines 8-9</p>	<p>Fig. 7E</p>
	<p>contact 38B, pg. 20, lines 32-33</p>	<p>Fig 7E</p>
<p>35. The method of claim 34 further comprising forming outer layers on the terminal portions configured to provide a non bonding surface for the bumped contact.</p>	<p>layers 46B, pg. 19, lines 4-9</p>	<p>Figs. 7B & 3D</p>
<p>38. The method of claim 34 wherein the substrate comprises a semiconductor material and further comprising forming an insulating layer in the opening prior to the depositing the conductive material step.</p>	<p>pg. 10, line 4 insulating layer 24B, pg. 19, lines 32-33</p>	<p>Fig. 7D</p>

<p>39. A method for fabricating an interconnect for electrically engaging a semiconductor component having at least one bumped contact comprising: providing a substrate having a</p>	<p>interconnect 10, pg. 9, lines 6-30 semiconductor component 18 bumped contact 14B</p>	<p>Fig. 1 Fig. 2C Fig. 7G</p>
<p>first surface and a second surface; forming a plurality of leads on the first surface configured to electrically engage and support the bumped contact, the leads having terminal portions and support portions connected by a connecting segment; forming a recess in the first surface at least partially encircled by the connecting segment configured to cantilever the terminal portions over the recess for movement within the recess during electrical engagement of the bumped contact; and forming an opening through the connecting segment and the substrate to the second surface; forming an insulating layer in the opening; and depositing a conductive material in the opening.</p>	<p>substrate 14B, pg. 18, line 33 to pg. 19, line 3 first surface 26B second surface 44B leads 22B, pg 19, lines 10-14</p>	<p>Fig. 7A Fig. 3C Fig. 3C Fig. 7C</p>
<p>40. The method of claim 39 further comprising shaping the terminal portions with a curvature matching a shape of the bumped contact.</p>	<p>connecting segment 40B, pg 19, lines 11-14 recess 20B, pg. 21, lines 10-14 pg. 21, lines 12-14</p>	<p>Fig. 7G Fig. 7I Fig. 7F</p>
<p>41. The method of claim 39 further comprising forming a contact on the second surface in electrical communication with the conductive material.</p>	<p>pg. 13, lines 5-8 opening 60D, pg. 19, lines 15-17 insulating layer 24B, pg. 19, lines 32-33 conductive material 66B, pg. 20, lines 8-9</p>	<p>Fig. 7D Fig. 7D Fig. 7E</p>
<p>43. The method of claim 39 further comprising forming a second insulating layer in the recess.</p>	<p>second insulating layer 24B, pg. 19 lines 32-33</p>	<p>Fig. 7D</p>
<p>49. A method for fabricating an</p>		

interconnect for electrically engaging a semiconductor component having a plurality of bumped contacts comprising:

providing a substrate having a

first surface and a second surface;

forming a plurality of interconnect contacts on the first surface configured to electrically engage the bumped contacts, each interconnect contact comprising a plurality of leads having terminal portions and a connecting segment on the first surface connecting the leads; forming outer layers on the terminal portions configured to provide non-bonding surfaces for the bumped contacts; forming a plurality of recesses in the first surface, each recess at least partially encircled by a connecting segment, the recesses configured to cantilever the terminal portions of the leads for movement within the recesses during electrical engagement; and forming a plurality of conductive vias in the connecting segments and in the substrate from the first surface to the second surface; and forming a plurality of contacts on the second surface in electrical communication with the conductive vias.

50. The method of claim 49 wherein the forming the conductive vias step comprises forming an opening through each connecting segment and depositing a conductive material.

51. The method of claim 49 further comprising forming projections on the leads prior to the forming the outer layers step.

interconnect 10, pg. 9, lines 6-30
semiconductor component 18, pg. 9
lines 6-30

bumped contacts 16, pg. 9,
lines 6-30

substrate 14B, pg. 18, line 33 to
pg. 19, line 3

first surface 26B

second surface 44B

interconnect contacts 14B, pg 18,
line 2 to pg. 21, line 20

bumped contacts, pg. 9, line 26
22B, pg 19, lines 10-14

terminal portions 30A, pg. 10, line 33
connecting segment 40B, pg 19,
lines 11-14

outer layers 46B, pg. 19, lines 4-9

pg. 13, line 27, to page 14, line 2
recesses 20B, pg. 21, lines 10-14

pg. 12, lines 2-5
conductive vias 42B, pg. 13,
lines 16-17

contacts 38B, pg. 20, lines 32-33

opening 60D, pg. 19, lines 15-17

conductive material 66B, pg. 20,
lines 8-9

projections 28B

Fig. 1
Fig. 2C

Fig. 2C

Fig. 7A

Fig. 3C

Fig. 3C

Fig. 7G

Fig. 2C

Fig. 2B

Fig. 7I

Figs. 7B & 3D

Fig 7F

Fig. 7E

Fig. 7E

Fig. 7D

Fig. 7E

Fig. 7B

Argument

The claims have been amended to include additional limitations which overcome the rejections, and further distinguish the claimed method from the prior art. In particular, the independent claims (34, 39, 49) have been amended to state that the substrate 12B (Figure 7A) includes a first surface 26B (Figure 3C) and a second surface 44B (Figure 3C).

Amended independent claim 34 recites the step of forming leads 22B (Figure 7I) which include a connecting segment 40B (Figure 7I). In addition, claim 34 recites the step of forming a recess 20B (Figure 7F) in the first surface at least partially encircled by the connecting segment 40B. Claim 34 also recites the step of forming an opening 64B (Figure 7D) in the connecting segment 40B and through the substrate 12B (Figure 7D). Claim 34 also recites the step of depositing a conductive material 66B (Figure 7E) in the opening 64B, and forming a contact 38B (Figure 7E) on the second surface in electrical communication with the conductive material 66B. These steps provide a conductive via 42B (Figure 7G), and a back side contact 38B (Figure 7G) which allow signals to be transmitted through the substrate 12B (Figure 7G) to the interconnect contact 14B (Figure 7G). In addition, the leads 22B are cantilevered over the recess 20B (Figure 7F), which functions to center and retain the bumped contact 14B (page 11, line 27). Amended independent claims 39 and 49 include similar recitations.

In Fjelstad et al. contact tabs 20 (Figure 2) are mounted to a connector body 40 (Figure 2) which functions as a substrate. The connector body 40 (Figure 2)

incorporates a sheet-like, metallic element having holes 46 therein (Figure 2, column 8, lines 38-39). In addition, conductive metallic via liners 52 are formed in the holes 46 (Figure 2, column 8, lines 43-45).

In Fjelstad et al. there is no recess forming step, because there are no recesses. Rather, the contact tabs 20 are mounted over holes 46 on the connector body 40. In addition, openings are not formed through both the contact tabs 20 and the connector body 40 as presently claimed. Rather, the connector body 40 includes the holes 46, and the contact tabs 20 are formed on a sheet, which is laminated to the connector body in alignment with the holes (Figure 7, column 11, lines 49-51).

The present method forms a simpler structure, which does not require an alignment and laminating step as in Fjelstad et al. Rather, the openings 64B (Figure 7D) for the conductive vias 42B (Figure 7E) can be formed using a self aligning technique, such as laser machining through both the connecting segment 40B and the substrate 14B (page 19, lines 15-18). In addition, the present method provides a recess 20B, which improves the performance of the interconnect contact 14B, because the recess 20B centers and retains the bumped contact 14B.

Amended independent claim 39 (and dependent claim 38) also recite that the substrate comprises a semiconductor material, and recite the step of forming an insulating material in the opening. In contrast, Fjelstad et al. teaches a metal substrate (i.e., metallic connector body 40). In support of the rejections, Sugiyama was cited as teaching a semiconductor material, and was combined with Fjelstad et al. The proposed motivation for the combination is stated in paragraph 4 of the Office Action

as: "providing a semiconductor material, as taught by Sugiyama, for the purpose of electrically communicating between two surfaces using the semiconductive material instead of metal".

However, the semiconductor substrate in the present method is not used for electrical communication, but rather as a material which has the same CTE as the semiconductor components being tested (page 4, lines 13-15). Similarly, in Fjelstad et al., the metallic connector body 40 is not used for electrical communication, but must be electrically insulated to prevent conduction (column 8, lines 39-41). The proposed motivation of using a semiconductor for electrical communication for the combination of Sugiyama and Fjelstad et al., is thus not plausible.

The step of shaping the leads has been removed from the independent claims, but has been included in amended dependent claim 40. This feature is submitted to be unobvious for essentially the same reasons advanced in the Amendment dated April 26, 2005. Specifically, one skilled in the art at the time of the invention would have no incentive to combine Maruyama et al. and Fjelstad et al. in the manner of the Office Action.


The step of forming a non bonding surface on the leads as recited in dependent claim 35, is also submitted to be unobvious for essentially the same reasons advanced in the Amendment dated April 26, 2005. Specifically, one skilled in the art at the time of the invention would have no incentive to combine Kazle and Fjelstad et al. in the manner of the Office Action.

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 34, 35, 38-41, 43 and 49-51 is respectfully requested. In addition, rejoinder of withdrawn dependent claims 36, 37, 42 and 52 is requested. Should any issues arise that will advance this case to allowance, the Examiner is asked to contact the undersigned by telephone.

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